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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/089,805 | 07/29/2002 | Bin Yang | 1516.1002/DMP | 3090 |
| 21171 | 7590 | 05/31/2006 | EXAMINER | |
| STAAS & HALSEY LLP SUITE 700 1201 NEW YORK AVENUE, N.W. WASHINGTON, DC 20005 | | | EJAZ, NAHEED | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2611 | |

DATE MAILED: 05/31/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/089,805

Applicant(s)

YANG ET AL.

Examiner

Naheed Ejaz

Art Unit

2611

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 March 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 and 18-23 is/are rejected.
- 7) ☒ Claim(s) 11-17 & 24- 28 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Drawings

1. The drawings are objected to because of the following informalities:
 - Blocks shown in figure 1 should be labeled such as element 14 should be labeled as 'Sign Table'. Label blocks 10 – 13, 14, 19 & 31.
 - In figure 2, label block 15.
 - In figure 3, label blocks 20, 21 22 & 23.
 - In figure 4, label blocks 24 – 30.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

2. Claim 1 is objected to because of the following informalities:
 - Replace "CORDIC algorithm" (page # 2, line 3) by "Cordinate Rotation Digital Computer (CORDIC)".
 - Replace " the signal" (page # 2, line 5) by "the digitized signal".
 - Replace " (I_n) " (page # 2, line 8) by " (I_N) ".
 - Replace "by applying a" (page # 2, line 8) by "by applying the N-step".
3. Claim 2 is objected to because of the following informalities:
 - Replace "a register value" (page # 2, line 4) by "the register value".
4. Claim 5 is objected to because of the following informalities:
 - Add " ; where SNR is signal to noise ratio" after $(\text{SNR} + 3)/6 \leq N \leq N_w - 2$ (page # 3, line 4).
5. Claim 7 is objected to because of the following informalities:
 - define 'f', 'T' and 'm' (page # 3, lines 7) (such as 'where f is frequency').
6. Claim 27 is objected to because of the following informalities:
 - Replace "GSM or UMTS" (page # 6, line 2) by "Global System for Mobile Communications (GSM) or Universal Mobile Telecommunication System (UMTS)".
7. Claim 28 is objected to because of the following informalities:
 - Replace "CORDIC algorithm" (page # 6, line 9) by "Cordinate Rotation Digital Computer (CORDIC)".

Claim Rejections - 35 USC § 112

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claim 1 is rejected under 35 U.S.C. 112 second paragraph because it is not clear if a signal is a digital signal before it's been sampled or after (page # 2, line 2). Replace "digitalized (x(k));" (page # 2, line 2) by "digitizing the sampled signal to produce a digitized signal (x(k));".

10. Claims 2-6, 18-21 & 23 are rejected under 35 U.S.C. 112 second paragraph since they depend on rejected independent claim, claim 1.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Corleto et al. (US 6,192,089) in view of Bruekers et al. (5,784,414), hereinafter referred as Corleto and Bruekers respectively.

Regarding claim 7, Corleto discloses, 'N micro-rotation blocks receiving a signal (i_0, q_0) (see figure 14, elements 142 & 148, col.6, lines 55-67, col.7, lines 1-36, col.9, lines 44-49) (it is noted that the mentioned elements are responsible to calculate the cordic algorithm steps including the calculation of arctan for in-phase and quadrature

components in complex plane therefore is considered to be equivalent to applicant's limitations in the claim), 'a sign table providing to each micro-rotation block a sign (σ_n) from a sign table' (see figure 17 & 18, col.10, lines 59-67, col. 11, lines 1-42), 'a register driving the sign table and supplying a register value ($w(k)$)' (figure 5, figure 16, element 192).

Corleto does not disclose add predetermined frequency value to delay element explicitly.

Bruekers teaches, 'a delay element' (see figure 14, elements DCU1 & DCU2), 'and adder adding a predetermined frequency value ($f.T/m$) to an output value of the delay element, outputting a result indicative thereof, and storing the result in the register, wherein the register value of preceding cycle ($k-1$) is supplied to the delay element' (see figure 14, elements DCU1 & DCU2, col.10, lines 17-27) (it is noted that in the mentioned column and lines Bruekers is teaching that sample values of $s_0, s_1, s_2, \dots, s_5$ which have frequency associated with (claimed predetermined frequency) are being inputted to delay elements DCU1 and DCU2 where signal F_{s1} is being added with each of the sample values s_0, s_1, \dots, s_3 and store in each of the flip flop of the delay elements F (see figure 14) hence reads on claim limitations).

It would have been obvious to one ordinary skill in the art to implement the teachings of Bruekers into Corleto in order to reduce the power consumption by coupling more than one digital quadrature processors (claimed micro rotation blocks) and reduce the sampling frequency of the split reception signal thus circuit can operate at a lower clock frequency as taught by Bruekers (see col.2, lines 49-55).

13. As per claim 8, Corleto teaches all the limitations in the previous claim on which claim 8 depends but he fails to disclose rotation of signal in first or fourth quadrant explicitly.

Bruekers discloses, 'rotating the signal into a first or fourth quadrant of the complex plane I/Q plane and providing a vector (i_0, q_0) representing the signal being rotated' (see figure 10a-10c, col.7, lines 8-19).

It would have been obvious to one ordinary skill in the art to implement the teachings of Bruekers into Corleto in order to reduce the power consumption by coupling more than one digital quadrature processors (claimed micro-rotation blocks) as taught by Bruekers (see col.2, lines 49-55).

14. Claim 8 is also rejected under 35 U.S.C. 103(a) as being unpatentable over Corleto et al. (US 6,192,089) and Bruekers et al. (5,784,414), as applied to claim 7 above, and further in view of Collier et al. (5,052,050), hereinafter referred as Collier.

15. Referring to claim 8, in addition to aforementioned rejection of claim 7, Corleto and Bruekers teach all the limitations in the previous claims on which claim 8 depends but they fail to disclose rotation of signal in first or fourth quadrant explicitly.

Collier discloses, 'rotating the signal into a first or fourth quadrant of the complex plane I/Q plane and providing a vector (i_0, q_0) representing the signal being rotated' (see figure 4 and 5, col.5, lines 15-25).

It would have been obvious to implement the teachings of the Collier into Corleto and Bruekers in order for demodulator to recover the modulation information correctly by removing the dc component of the I and Q signals because these signals represent

the phase of the signal which would be used in detecting the frequency and thus enhance the system reliability as taught by Collier (see col.1, lines 45-58).

16. Claims 9 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Corleto et al. (US 6,192,089 and Bruekers et al. (5,784,414), as applied to claims 7 & 8 above, and further in view of Jack E. Volder ('The Cordic Trigonometric Computing Technique,' *IRE Transactions on Electronic Computer*, Vol. EC-8, pp.330-334, September 1959), hereinafter referred as Volder.

17. Refer to claim 9, Corleto and Bruekers teach all the limitations in the previous claims but they do not show shift register of the micro-rotation block and accumulators adding the output values of the shift register explicitly.

Volder discloses, 'two shift registers shifting components of an input vector (I_n , Q_n) of the micro-rotation block by n bits and providing output values' (see figure 2, elements 'X Register' & 'Y Register'), 'two accumulators adding the components of the input vector (I_n , Q_n) to the output values of the shift registers, the output values of the shift registers being provided with the sign (σ_n) allocated to the respective micro-rotation block (see figure 2, elements 'Adder- Subtractor' & figure 3).

It would have been obvious to one ordinary skill in the art to implement the teachings of Volder into Corleto and Bruekers in order to employ unique technique for solving the trigonometric relationships involved in plane coordinate rotation as taught by Volder (see page # 334, col.2, 'conclusion') and thus recovered phase modulation information by analysis of the positions of the vectors in the complex planes.

18. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Corleto et al. (US 6,192,089, Bruekers et al. (5,784,414) and Jack E. Volder ('The Cordic Trigonometric Computing Technique,' *IRE Transactions on Electronic Computer*, Vol. EC-8, pp.330-334, September 1959), as applied to claims 7-9 above, and further in view of Welles, II et al.(4,603,300), hereinafter referred as Welles.

19. Refer to claim 10, Corleto, Bruekers, and Volder teach all the limitations in the previous claims on which claim 10 depends but they fail to disclose XOR gates.

However, Welles teaches, 'a read-only memory comprising 2 (N-2) bits' (see col.7, lines 19-30), 'an XOR gate' (see figure 5, 8, or 9, col.6, lines 59-68, col.9, lines 31-54), 'an inverter' (see figure 7, element 76).

It would have been obvious to one ordinary skill in the art to implement the teachings of the Welles into Corleto, Bruekers, and Volder in order to recover the modulating signal including frequency components by obtaining the difference in successive binary numbers, a sequence of binary numbers representing successive levels of the modulating signal is obtained as taught by Welles (see col.3, lines 33-53, col.4, lines 38-55).

20. Claim 22 is rejected under the same rational as mentioned in claim 9 rejection above.

Allowable Subject Matter

21. Claims 11-17 and 24-27 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

22. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Vankka (US 6,693,970) discloses QAM modulator.
- Vankka (US 2003/0206600) teaches QAM modulator.

Contact Information

23. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Naheed Ejaz whose telephone number is 571-272-5947. The examiner can normally be reached on Monday - Friday 8:00 - 4:30.

24. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on 571-272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

25. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Examiner
Art Unit 2611

N.E.
5/22/2006


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